

1	SYNTHETIC DRYING OILS	424	.Specified procedure to improve separation of solids from liquid product
2	PHENOLIC OR TOXIC OILS		
3	OXIDATION OF MINERAL OILS		
4	.To form asphalts, tars or pitches	425	..Including centrifugation, filtering, flotation or vibration
5	..In presence of solid contact material	426	.Including agglomeration, comminution or size-classification of solids
6	..Tar, pitch, or asphalt feed		
7	.With cracking	427	.Including burning of feed or product
390	TAR SAND TREATMENT WITH LIQUID		
391	.Inorganic (only) liquid	428	.Including contact with extraneous additive other than hydrogen, e.g., solvent, etc.
400	BY TREATMENT OF SOLID MINERAL, E.G., COAL LIQUEFACTION, ETC.		
401	.Including a test or measurement	429	..Distinct addition zones
402	.Using electrical, magnetic or wave energy	430	..Contact with additive, followed by chemical conversion
403	.Chemical modification of solids before hydrogenation	431	..Specified hydrogen-donor solvent
404	.Using molten additive, e.g., heat carrier, etc.	432	..With specified circulation procedure in contact zone
405	..Molten catalyst	433	..Simultaneous treatment with gaseous additive and liquid solvent
406	...Halide-containing		
407	.Specified agitation or circulation in gas contact zone	434	..Additive is petroleum or fraction from petroleum refining
408	..Gas includes hydrogen		
409	..Vertical gas upflow, e.g., fluidization, etc.	435	..Additive is specified catalyst or liquid solvent or dispersant
410	...Using solid heat carrier		
411	..Using solid heat carrier	12	COLORING TREATMENTS (INCLUDES FLUORESCENCE)
412	.Plural hydrogenation steps	13	TREATMENT OF REFINING SLUDGE
413	..Solid catalyst in at least one step	14	PRODUCTS AND COMPOSITIONS
414	.With hydrogen production from water	15	.Fuels
415	.Including contact of feed with liquid produced in the process, i.e., recycle	16	..Gasolines
		17	...Admixtures
416	..With discrete hydrogenation of recycle stream	18	.Lubricating oils
		19	..Admixtures
417	..Recycle of bottoms (resid)	20	.Waxes
418	..Including contact with hydrogen gas	21	..Admixtures
		22	.Asphalts, tars, pitches and resins
419	.Using specifically added catalyst during hydrogenation	23	..Admixtures
		24	PARAFFIN WAX; TREATMENT OR RECOVERY
420	..Dissolved or suspended-thermally-decomposable catalyst, component or precursor	25	.With ureas
		26	.With sorption agents
421	..Containing Group VI transition metal	27	.Chemical treatment (refining or modification except mere solvent extraction)
422	...And Group VIII metal	28	.Separation of paraffin from oil (e.g., dewaxing)
423	..Containing Group VIII metal	29	..Emulsion dewaxing

30	..Separation of residual oil from wax (i.e., deoiling)	61	...With subsequent thermal or catalytic cracking
31	...With solvent	62	..First stage is reforming
32	...Sweating	63	...Reforming in all stages
33	..Solvent dewaxing	64	....Catalyst in at least one stage
34	...With deasphalting treatment	65	.....Noble metal containing catalyst
35	...With chilling by evaporation of solvent	66	...Catalytic
36	...With nondewaxing solvent extraction of oil	67	..First stage is thermal or catalytic cracking
37	..Chilling	68	...With subsequent hydrocracking
38	...With filtering	69	...With subsequent reforming
39	ASPHALT, TARS, PITCHES AND RESINS; MAKING, TREATING AND RECOVERY	70	....Catalytic reforming
40	..By chemical conversion of oil	71	...With subsequent polymerization
41	..By distillation	72	...Cracking in all stages
42	..Tar feed	73	....Catalyst in at least one stage
43	...By contact with hot gases	74	.....Catalyst in multiple stages
44	..Chemical modification of asphalt, tar, pitch or resin	75	....With cracking of total product from first stage
45	..Solvent extraction	76	....With cracking of the first stage bottoms
46	CHEMICAL CONVERSION OF HYDROCARBONS	77	....With cracking of the first stage intermediate fraction
47	..With prevention of corrosion or erosion in system	78	..Plural parallel stages of chemical conversion
48 R	..With prevention or removal of deleterious carbon accumulations or equipment	79	..At least one stage is reforming
48 Q	..Quench	80	..Split feed
48 AA	..Antifoulant additive	81	..With contacting vapor products with liquid feed (i.e., product scrubbing and feed stripping)
49	..Plural serial stages of chemical conversion	82	..Only selected fractions of product or feed are contacted
50	..Coking in at least one stage	83	..With subsequent fractionation
51	...With reforming	84	..With added material (to scrubbing-stripping stage)
52 R	...With both catalytic and thermal cracking	85	..With preliminary treatment of feed
52 CT	....Catalyst treatment to remove metal contaminants	86	..Deasphalting
53	...First stage is coking	87	..Solvent extraction
54	....Second stage is cracking	88	..Refining
55	....Catalytic cracking	89	...With hydrogen
56	..Hydrogen donor diluent cyclic processes	90	...With acids
57	..First stage is an hydrogenation (saturation)	91	...With solid absorbents
58	..First stage is hydrocracking (includes hydro-desulfurization under cracking conditions)	92	..Distillation
59	...Hydrocracking in all stages	93	...With blending of products of distillation with each other or with converted products
60	...With subsequent reforming	94	...Plural stages of distillation
		95	..With subsequent treatment of products

96	..Solvent extraction	115	...Halogen containing catalyst
97	..Refining	116	....Metal halide
98	...With acids	117	.....Group III metal halide
99	...With solid adsorbents	118	...Silica or silicate containing catalyst
100	..Separation of vapors and liquid products	119	....With metal or metal oxide
101	...With absorption with liquid	120.01	.....With group III metal, rare earth metal, or metal oxide (i.e., Sc, Y, Al, Ga, In, Tl, metal of atomic number 57-71 or oxide thereof)
102	...With additional separation of liquid products from primary separation zone	120.05	.....With group VII metal or metal oxide (i.e., Mn, Tc, Re, or oxide thereof)
103	...With additional separation of vapor products	120.1	.....With group IV metal or metal oxide (i.e., Ti, Zr, Hf, Ge, Sn, Pb, or oxide thereof)
104	....With distillation of second stage liquid	120.15	.....With group I metal or metal oxide (i.e., alkali metal, Ag, Au, Cu, or oxide thereof)
105	....With condensation of second stage vapors	120.2	.....With group V metal or metal oxide (i.e., V, Nb, Ta, As, Sb, Bi, or oxide thereof)
106	..Cracking	120.25	.....With group II metal or metal oxide (i.e., alkaline earth metal, Be, Mg, Zn, Cd, Hg, or oxide thereof)
107	..Hydrogenative	120.3	.....With group VI metal or metal oxide (i.e., Cr, Mo, W, Po, or oxide thereof)
108	...Catalytic	120.35	.....With group VIII metal or metal oxide (i.e., iron or platinum group metal, or oxide thereof)
109	....Silica or silicate containing catalyst	121	...Metal or metal oxide containing catalyst
110	.....With metal or metal oxide	122	....Group III metal or oxide
111.01	.....With group III metal, rare earth metal, or metal oxide (i.e., Sc, Y, Al, Ga, In, Tl, metal of atomic number 57-71, or oxide thereof)	123	.....With Group VI metal or oxide
111.05	.....With group VII metal or metal oxide (i.e., Mn, Tc, Re, or oxide thereof)	124	.....With Group VIII metal or oxide
111.1	.....With group IV metal or metal oxide (i.e., Ti, Zr, Hf, Ge, Sn, Pb, or oxide thereof)	125	..With nonreactive material
111.15	.....With group I metal or metal oxide (i.e., alkali metal, Ag, Au, Cu, or oxide thereof)	126	...Solids
111.2	.....With group V metal or metal oxide (i.e., V, Nb, Ta, As, Sb, Bi, or oxide thereof)	127	....Suspension system
111.25	.....With group II metal or metal oxide (i.e., alkaline earth metal, Be, Mg, Zn, Cd, Hg, or oxide thereof)	128	...Vapors
111.3	.....With group VI metal or metal oxide (i.e., Cr, Mo, W, Po, or oxide thereof)	129	....Combustion gases
111.35	.....With group VIII metal or metal oxide (i.e., iron, or platinum group metal, or oxide thereof)	130	....Steam
112	....Metal or metal oxide catalyst	131	..Soaking
113	..Catalytic	132	..With heating in tubular confined stream
114	...Phosphorus, boron or nitrogen containing catalyst	133	..Reforming (includes dehydrogenation, isomerization, cyclization, aromatization, alkylation, dealkylation reactions)
		134	..Catalytic

135	...With Group III metal or metal oxide containing catalyst	171	...Uniform solids withdrawal
136	....With Group VI metal or metal oxide	172	...Preheating or quenching with solids
137	....With Group VIII metal or metal oxide	173	...Solids transferring
138	.....Noble metal or oxide thereof	174	....By pneumatic lifting
139	.....With halogen containing additive	175	.....Compact type
140	.....With recovery or reactivation of catalyst	176	..Solids moving processes
141	...Feed of specific composition	177	REFINING
142	..Hydrogenation (saturation)	178	..With reagent feed control
143	..Catalytic	179	..Purifying used oil
144	...Feed of specific composition	180	..With added organic material
145	...With added source of hydrogen (includes hydrogen donor)	181	..Plural treating agents (sequential or simultaneous)
146	..Solids contacting and mixing	182	...One is a solid contact material
147	..Separate contiguous, dissimilar function, contacting zones	183	....With acid or alkali
148	..Combined gravitating bed and suspension zones	184	..Distillation or degassing
149	..Solids of dissimilar composition	185	...With gaseous treating agent
150	..Purging	186	...With solid-liquid separation
151	...Plural stages	187	..Water removal (dehydration)
152	..Solids replenishment, or selective discard	188	..With treating agent
153	..Suspension system	189	..Sweetening
154	...Start-up and shut down procedures	190	..With hypochlorites
155	...Plural zones of similar function	191	..With copper compounds
156	....Solids and contacting fluids are both in series	192	...With preliminary treatment of oil
157	...Liquid feed	193	...With subsequent treatment of the sweet oil
158	...With augmented turbulence (in addition to normal mixing in bed)	194	....Separation or recovery of copper compound
159	...With temperature regulation	195	...Copper chloride and free oxygen containing gas
160	....By solids circulation to external heat exchange and return to same zone	196	..With peroxides
161	...Separation of entrained fines from effluents	197	..With lead compounds
162	....In presence of a liquid	198	...Lead sulfide
163	...Fluidized dense bed	199	...Sodium plumbite
164	....Solids transferring	200	....With preliminary treatment of the oil
165	..Gravitating compact beds	201	....With subsequent treatment of the sweet oil
166	...Liquid feeding	202	.....Organic treating agent
167	....Solids curtain type	203	..With alkali metal hydroxide or carbonate
168	...Solids-vapor disengagement	204	...With added oxygen containing organic compound
169	...Plural zones of similar function (same chamber)	205	....Acyclic alcohol
170	...Size stratification prevention	206	...With added nitrogen containing compound
		207	..Nitrogen containing compound
		208 R	..Sulfur removal (free or combined sulfur)
		209	..With hydrogen
		210	...Plural stage treatments with hydrogen

211	...With preliminary treatment of feed	245	..With silicon or compound thereof
212	...With subsequent treatment of product	246	..With Group IB metal or compound
213	...With solid catalyst or absorbent	247	..With Group IIB metal or compound
214	....With hydrogen yielding material (H donor)	248	..With Group III metal or compound
215	....With heavy metal sulfide	249	..With Group IV, V, VII metal or compound
216 R	....With group VI metal or compound	250	..Solids contacting and mixing
216 PP	.....With specific porosity or pore volume	208 M	..Using free alkali metal
217	....With Group VIII metal or compound	251 R	.Metal contaminant removal
218	..Split treatment	252	..With acid
219	..With acids	253	..With metal or metal compound
220	...Plural stages of sulfur removal	251 H	..Employing hydrogen
221	...With preliminary treatment of feed	254 R	.Nitrogen contaminant removal
222	...With subsequent treatment of product	254 H	..Employing hydrogen
223	...Inorganic acid	255	.Gum or gum former removal
224	....Sulfuric acid	256	..With acid
225	....Hydrochloric acid	257	..With metal or metal compound
226	..With alkali or alkali earth metal compound (except clays)	258	...Alkali metal
227	...Plural stages of sulfur removal	259	...Alkali or alkali earth metal compound (except clays)
228	...With preliminary treatment of feed	260	...Clay type or alumina
229	...With subsequent treatment of product	261	....Vapor phase treatment
230	...Alkali metal compound	262.1	.Halogen contaminant removal
231	....With added oxygen containing organic compound	262.5	..Polychlorinated biphenyl (PCB)
232	.....Alcohol containing	263	.Organic acid or phenol contaminant removal
233	.....With other organic compound	264	.With hydrogen
234	.....With regeneration of treating agent	265	.With acids
235	....With regeneration of treating agent	266	..Sulfuric acid
236	..With nitrogen containing treating reagent	267	...With fluid rotation or agitation
237	..With organic reagent	268	...White oil making
238	...Hydrocarbon containing	269	...Split treatment
239	...Heavy metal soap containing	270	...Plural stages of acid treatment
240	...Oxygen containing	271	...With preliminary treatment of the oil
241	..With free halogen or nonmetal halide containing reagent	272	....Fractionation
242	..With sulfur oxides	273	...With subsequent treatment of the oil
243	..With Group VI metal or compound	274	....Organic treating agent
244	..With Group VIII metal or compound	275	....Solid absorbent
		276	...With nonwater additive
		277	....Organic compound
		278	....Solid contact material
		279	..Phosphorus containing acid
		280	..Halogen containing acid
		281	...Hydrochloric acid
		282	..Organic acid
		283	.With alkali or alkali earth metal compound (except clays)

284	..Alkali metal compound	316	...Difference is mere change in proportions of solvents
285	...With preliminary treatment of the oil	317	..Counter current multistage extraction
286	...With subsequent treatment of the oil	318	..With recycle of oil
287	...With solid carrier	319	..With pressure variation
288	...With added material	320	..With temperature gradient in extraction zone or between extraction zones
289	.With nitrogen containing compound	321	..With solvent rehabilitation
290	.With organic compound	322	..Organic solvent containing
291	..Oxygen containing	323	...With added solvent or solvent modifier
292	.With boron, phosphorus, arsenic, antimony or bismuth containing treating agent	324	....Inorganic
293	.With sulfur containing treating agent	325	...Heterocyclic
294	.With free metal	326	....Hetero-N-containing
295	.With Group IV, V, VI, VII or VIII metal compound	327	....Furfural and derivatives
296	.With Group IB or IIB metal compound	328	...Nonoxo carbonylic
297	.With Group III metal compound (except clays)	329	....Carboxylic esters
298	.With liquid treating agent (includes slurries of solids)	330	...Nitrogen-containing solvent
299	.With solid catalyst or absorbent	331	....Amino compound
300	..Of particular physical shape or structure	332	...Oxo compound containing
301	..With preliminary treatment of the oil	333	...Oxy compound
302	..With subsequent treatment of the oil	334	....Ethers
303	..Plural treating stages	335	....Aromatic
304	..Processes including downward movement of particles	336	...Halogen containing
305	..Solids rehabilitation	337	...Hydrocarbon
306	..Composite or plural treating agents	338	..Liquid sulfur dioxide
307	..Silicon or carbon containing treating agent	339	..Liquid-liquid contacting
308	FRACTIONATION	340	.Recovery of mineral oil from natural or converted gases
309	.Deasphalting	341	..By absorption and vaporization
310 R	.Adsorption	342	...With fractional condensation prior to absorption
310 Z	..Zeolite adsorbent	343	...Indirect heat exchange between lean and rich absorbent
311	.Liquid extraction with solvents	344	...Plural absorption stages
312	..With blending of separated fractions with each other or with feed	345	....At least one stage is under pressure
313	..Extractive distillation	346	...Absorption stage is under pressure
314	..Plural stages with different oil miscible solvents	347	.Distillation
315	...With recycle of product of later extraction to earlier extraction stage	348	..With nonvapor compound added prior to or during vaporization
		349	..With nonvaporization treatment of liquid condensate or residue
		350	..Rectification
		351	...C1-C4 alkane removal
		352	...Flash vaporization
		353	...With heat recovery by indirect heat exchange
		354	...Plural or combined with additional distillation

- 355 ...With product recycle between
 distillation zones
- 356 ...With added gas or vapor (e.g.,
 steam)
- 357 ...Vacuum or pressure
- 358 ...With liquid product recycle to
 rectification zone
- 359 ..Spraying
- 360 ..Filming
- 361 ..Flash vaporization
- 362 ..With added gas or vapor
- 363 ...Steam
- 364 ..Plural stages of vaporization
- 365 ...With heat recovery by indirect
 heat exchange
- 366 ..Vacuum or pressure
- 367 ..With agitation of distilland
- 368 ..Condensatin by direct heat
 exchange
- 369 ..Volatile treatment other than
 condensation
- 370 **MISCELLANEOUS**

CROSS-REFERENCE ART COLLECTIONS

- 950 **PROCESSING OF "FISCHER-TROPSCH"**
 CRUDE
- 951 **SOLID FEED TREATMENT WITH A GAS**
 OTHER THAN AIR, HYDROGEN OR
 STEAM
- 952 **SOLID FEED TREATMENT UNDER**
 SUPERCRITICAL CONDITIONS

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